



**SYSTEM AND METHOD FOR DISPLAYING  
REMOTELY STORED CONTENT ON A WEB PAGE**

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BACKGROUND OF THE INVENTION

The present invention relates generally to methods and systems for providing content to a web site.

A web site comprises a collection of linked web pages resident on a host server that may be accessed by a browser. The web site could reside on the Internet, an intranet, an extranet or other network environment. Each web page within the web site is a text file containing Hypertext Markup Language ("HTML") instructions regarding the layout of the web page. A web page may be accessed by a browser using the web page's Uniform Resource Locator ("URL"), which is essentially an

address path identifying the server that hosts the desired web page and the location of the web page on the server.

With a browser, such as Internet Explorer™ or Netscape Navigator™, a user can send a request from a client computer to access a web page stored at a particular URL on a host server. When the host server receives the user's request, it sends the requested web page to the client computer, where the document is parsed by the browser and displayed. A communications protocol used in making such a request and in transferring web pages is the Hypertext Transfer Protocol ("HTTP").

There are a multitude of devices and platforms that provide access to web sites. Since web browsers are available on a variety of such platforms and devices, most networks, particularly the Internet, can be accessed virtually anywhere. Furthermore, the network can be accessed not only with a general-purpose computer, but also with a handheld computer, cellular phone or internet appliance, such as a refrigerator, toaster, stove, or any other device with a network connection.

One factor in the commercial viability of a web site is its ability not only to attract users, but also keep users coming back to the web site. A site's ability to promote return users is commonly known as "stickiness." To promote stickiness, the web site should contain useful content that piques the user's interest. Due to the costly time-intensive expenditure required

to generate useful content, however, most web sites fail to maximize user retention. As a result, such sites may fail to realize their full value.

Due to the cost prohibitive nature of generating sufficient useful content to retain users, many web sites provide access to content available at other sites. In one common technique, a host site provides one or more links to other web sites that contain the desired information. While useful in providing content, a link moves the user from the host site to the site where the content resides and therefore necessarily reduces the amount of time the user actually spends on the host web site. That is, while the host site provides a link in order to increase its value to users, and thereby encourage users to visit the site, the link ultimately encourages users to leave.

Web sites also provide additional content through the use of frames. By framing a web site, the browser display is subdivided into two or more sections (frames), where the contents of each frame are taken from a different web page. Accordingly, the user may navigate information from other web sites within the frames without ever leaving the web site. Although frames provide flexibility in designing web pages, many designers avoid using frames because they are supported unevenly by current browsers. Moreover, users may have a tendency to go

directly to the framed web sites rather than navigating through the frames.

#### SUMMARY OF THE INVENTION

The present invention recognizes and addresses disadvantages of prior art constructions and methods.

Accordingly, it is an object of the present invention to provide an improved system and method for displaying content on web pages.

This and other objects may be achieved by a process for providing, on a web page provided by a host server, content that resides on a server that is remote from the host server over a distributed computer system. A web page requested from the host server is downloaded to a client computer, at which the requested web page is parsed. In response to an instruction parsed from the requested web page, executable code is downloaded to a client computer from a remote server specified in the instruction. The executable code is executed on the client computer. Responsively to the executable code, content is downloaded from the remote server to the client computer and displayed on the requested web page.

In a system for displaying, on a web page provided by a host server, content that resides on a server that is remote from the host server a distributed computer system, a host

server is in communication with a client computer over the distributed computer system. A web page resides on the host server. The remote server is in communication with the client computer over the distributed computer system. Data is coupled to the remoter server. A browser at the client computer is configured to request, receive and parse the web page. First computer program code resides within the web page and is configured to establish, upon execution of the first code by the browser, a communication connection over the distributed computer system between the browser and the remote server and to request the content. Second computer program code resides at the remote server and is configured to receive the content request from the first code through the connection, to obtain the content from the data responsively thereto, and to forward the content to the browser. The first code is configured to display the content received from the second code on the web page.

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate one or more embodiments of the invention and, together with the description, serve to explain the principles of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

A full and enabling disclosure of the present invention, including the best mode thereof directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures, in which:

Fig. 1 illustrates a network schematic of a system, according to an embodiment of the present invention;

Fig. 2 is a flow chart illustrating the steps of a method according to an embodiment of the present invention; and

Figs. 3a - 3f illustrate a user interface and content displayed on a requested web site according to an embodiment of the present invention.

Repeat use of reference characters in the present specification and drawings is intended to represent same or analogous features or elements of the invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference is made in detail to presently preferred embodiments of the invention, one or more examples of which are illustrated in the accompanying drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that modifications and variations can be made in the present invention without departing from the scope or spirit

thereof. For instance, features illustrated or described as part of one embodiment may be used on another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

One or more of the preferred embodiments of the present invention as described below operates within and/or in conjunction with a distributed computing system. Generally, such a system includes multiple memory storage and computing devices located remotely from each other. The execution of program applications may occur at these remote computing sites as data is transferred among the memory devices and by between the computing devices over an extended system. Examples of distributed computer systems include the Internet, local and wide area networks, virtual private networks, and point-to-point systems. The Internet is a global accumulation of computer networks linked by routers that direct communication among the networks through an information retrieval system, most commonly the World Wide Web.

Certain operations and processes described herein are executed by one or more computers within a distributed computing system. As should be well understood, a computer transforms information in the form of electronic signals input into the



computer to desired output. The input may be provided by a human operator, another computer, or from other external sources. To accomplish these functions in one computing environment, a conventional general purpose computer includes a processor, read-only and random-access memory, a bus system and input/output systems to transfer information within the computer and to interact with external devices. The computer's memory includes an operating system and various application programs that run on the operating system.

As noted above, the present invention provides content on a web page where the content resides on a server specified by the web page. Although the content server is remote from the host web page server, the content is seamlessly retrieved from data coupled to the remote server and is displayed on the web page at a client computer. In a preferred embodiment, the web page establishes a search interface to a database coupled to the remote server that allows the user to query the database and display the search results on the web page.

Referring to Fig. 1, for example, a distributed computing system includes a plurality of client computers **12** connected to a host server **14** and a remote server **16** via a network **10**. Although Fig. 1 depicts the network **10** for exchanging data as the Internet, the present system is not limited to the Internet and may be implemented in the context of any network

environment. Client computers **12** could be any network enabled device, such as a personal computer, a handheld computer, a cellular phone or the like. It will be clear to one of ordinary skill in the art that client computers **12**, host server **14** and remote server **16** can be networked using numerous devices, platforms and network architectures.

Client computers **12** run browser software, such as Internet Explorer™ or Netscape Navigator™, that is able to communicate with both host server **14** and remote server **16**. As should be understood in this art, browser software establishes a system path between the browser's computer and a server on the network, for example as identified by the server's URL. Through such a system path, the server may transfer web pages that include content such as text and graphic images, and sound and video files using a standard description language such as HTML. Although browser software communicates with host server **14** and remote server **16** preferably using HTTP, the present system and method could be adapted to networks that do not employ HTTP. Browser software preferably is also adapted to run executable code, such as a Java applet or ActiveX control. In the case of a Java applet, the browser preferably has a Java Virtual Machine to run executable code files. With an ActiveX control, the browser may have a plug specific to the executable code.

Host server **14** is capable of communicating with client computers **12**, but need not necessarily communicate with remote server **16**. Host server **14** runs web server software, such as Internet Information Server™ or Apache™, that is capable of responding to HTTP instructions from client computers **12**. Host server **14** has at least one web page residing thereon that may be accessed by a client computer **12** using the web page's URL.

Remote server **16** is capable of communicating with client computers **12**, but does not need to be able to communicate with host server **14**. Like host server **14**, remote server **16** runs web server software; however, remote server **16** need not have any web pages residing thereon. Instead, an executable code resides on remote server **16**, and remote server **16** runs an application that handles requests from client computers **12** regarding the executable code at the client computers.

A business enterprise may employ a web site hosted by server **14** in pursuit of its business, for example providing access to information regarding medical services and medical service providers. The enterprise may desire in this case to also provide ancillary information, for example relating to pharmaceuticals, that may be of interest to its web site visitors but that may be prohibitively difficult for the enterprise to independently compile. Accordingly, in building its web site, the business enterprise may contact an appropriate

content provider manually or through the content provider's web site and request the use of the desired content on its page.

The content provider makes the content available to the enterprise through instruction code manually written into the business enterprise's web page or downloaded from the content provider's web site and inserted into the web page code. The instruction code identifies the location of an executable code file that is configured to establish a connection between a client browser and remote server **16** and to request downloading of content from the remote server to the client browser. An exemplary HTML code instruction is as follows:

```
<applet code="com.MyApplet.class"
        archive="MyApplet.jar"
        codebase="http://www.sample.com/applet"
        height="250" width="145"
        MAYSCRIPT>

</applet>
```

Any suitable instruction format may be used, and it should therefore be understood that this HTML example is provided for purposes of illustration only.

Referring to the example, "<applet" is an anchor opening for the identification of a Java executable code file

"com.MyApplet.class" that utilizes the classes "MyApplet.jar." The Java code and the classes are found at a server **16** address "http:\\www.sample.com\\applet". The height and width definitions refer to screen dimensions within the client computer's browser window within which content conveyed by the executable code is displayed.

Fig. 2 provides a flow chart illustrating the communication between the client computers, the host server and the remote server. Referring also to Fig. 1, a client computer browser requests a web page from host server **14** through HTTP instructions using the web page's URL. Upon receiving the request, host server **14** sends an HTTP response containing the HTML for the requested page.

Referring to the instruction code example above, once client computer **12** receives the web page, the browser software parses the page's HTML code and recognizes that the HTML references an executable code file ("com.MyApplet.class") that resides on a remote server **16** specified by the web page (at "http:\\www.sample.com\\applet"). Responsively to the anchor, the client computer's browser establishes a new HTTP connection to the remote server **16** requesting the executable code file. Upon receiving the request, the remote server **16** sends the executable code file (in this case Java byte code) back to client computer **12**, which then runs the downloaded code. With

respect to the present Java example, the browser software loads the applet's java byte code and runs the applet in the browser's Java Virtual Machine ("JVM").

The executable code may be configured to download content from remote server **16** through various suitable mechanisms. For example, the code may automatically download and display content without interaction by a client computer user. In a Java example, a downloaded applet automatically establishes an HTTP connection with the remote server over network **10** and communicates with a servlet at the remote server through the client computer's browser. The applet then requests content identified within the applet. The servlet queries database **18** for the identified content, obtains the content from the database and forwards the content over the HTTP connection to the applet at the client computer's browser. The applet then processes the content and displays the content at the window described in the HTML instruction.

In the embodiment described with respect to Fig. 2, however, the applet generates and displays an interface, or an icon on the web page through which a user may activate the interface, at client computer **12** without automatically downloading content. Referring also to Fig. 3a, for example, the interface may be a search engine implemented in a Java byte code that presents an interface display screen **20** within a

downloaded web page **22** (shown blank in Fig. 3a for clarity) as described by the HTML instruction. The code establishes an HTTP connection with the remote server only in response to user interaction with the interface.

Upon each request by the user entered through the displayed interface, the client computer's browser creates a new HTTP connection with remote server **16** and sends the appropriate search request information. This connection remains open until a servlet at the remote server returns a response or the applet specifically closes the connection. Upon receiving the search request from the search engine applet, the remote server's servlet retrieves the requested information from database **18** and forwards the requested content to client computer **12**. The applet processes the content and displays the content on the web page at the client computer within the browser window as described in the HTML instruction.

It should be understood that the downloaded Java applet, or other type of code file, may establish other suitable types of interfaces. For example, the interface may comprise a template designed to receive order information from a user at the client computer. That is, the template may permit the user to download content regarding the content provider's products or services. If the user selects certain desired products or services, the template may permit the user to enter information identifying

the user, requesting the desired products or services and indicating a method of payment. Each time the user requests or submits information, the applet transmits the request or submission to the remote server and requests appropriate information from the remote server to respond to the user. It should be understood that in such commercial transactions, the applet may establish a more secure connection, for example through Secure Sockets Layer communication.

It should be understood by those skilled in the art that the applet may be configured to establish a new HTTP connection with remote server **16** or any other server available on the network. If the applet is written as a signed applet, the applet may make a connection to any server residing on the network that accepts connections from the author of the applet. A signed applet is an applet whose source and integrity are guaranteed by its author. This is done by attaching a digital signature to the applet that indicates who developed the applet, when the applet was developed, and whether it has been tampered with since that time. Accordingly, the signed applet may reside at a server other than remote server **16**, for example host server **14**, and still retrieve content from the remote server. If the applet is written as an unsigned applet, however, the applet will be restricted to connecting to the remote server from which the applet was downloaded.



The executable code is called from an instruction embedded in the web page and is, therefore, encapsulated from the web page HTML. Thus, it is not necessary to reconstruct the web page at the client computer each time new content is called.

Regardless of the particular mechanism by which the executable code in such embodiments downloads information from the remote server to the client computer, the content is presented on the web page without providing the user access to other web sites. The code seamlessly gathers content from the remote server without notifying the user that the content originates anywhere other than the host server site. This reduces the user's tendency to navigate other web pages. Thus, the host enterprise may take advantage of the resources of an avid content provider while reducing the risk of losing visitors to its web site.

For purposes of illustration only, the following example illustrates the use of a search engine to provide remote web page content relating to pharmaceuticals and related medical information. Returning to Fig. 3a, the applet displays interface screen **20** within web page **22** (shown blank for purposes of clarity) on a browser window **24**. As described above, the applet may present screen **20** automatically upon construction of the web page or may provide an icon within the web page which, upon activation by the user presents screen **20**. A close button

(not shown) may be provided on screen **20** to eliminate the screen and return the icon.

Screen **20** allows the user to select from three types of searchable information depending on whether the user selects a "Drug," "Condition" or "Info" tab at the top of the screen. With the "drug" tab selected, as is shown in Fig. 3b, a plurality of drug names are loaded from remote server **16** by typing "t" in a text box and clicking a "Go" button. Activating the "Go" button causes the applet to establish an HTTP connection with the remote server. Responsive to the "t" request, a servlet at the remote server downloads a list of drugs meeting the request criteria. The browser applet displays the downloaded drugs in a content screen **26**. Upon clicking on a desired drug, the interface applet establishes another HTTP connection with the remote server, requests predetermined information regarding the selected drug and displays the information in an information window **28** (Fig. 3c) placed over screen **20**. More specific information regarding the drug may be retrieved by activating "Savings," "Description," "Instructions," "Side Effects" and/or "Miscellaneous" buttons listed at the top of window **28**. By choosing the "Savings" tab, for example, the user could learn that cost is significantly reduced by using a generic version of the drug. Once the user

has reviewed information regarding the selected drug, the user may close the window and search for other drug information.

Upon selecting the "condition" tab at screen **20** (Fig. 3d), and entering a disease or symptom in the text box, activation of the "Go" button causes the applet to establish an HTTP connection with the remote server and download from the remote database a list of those drugs related to the submitted disease or symptom. The applet receives the list and displays the drugs in window **26**. If the user clicks on one of the downloaded drugs, the applet displays a descriptive window **28** (Fig. 3c).

Upon choosing the "Info" tab, the applet presents the screen **20** shown in Fig. 3e. The user may enter a disease, condition or drug in the text box and indicate the sources that the user desires to search with respect to that term. Upon activating the "Go" button, the applet establishes an HTTP connection with the remote server and searches the selected area for the input term. The remote server applet searches the remote database and downloads the resulting content to the client computer applet, which displays the search results in a window **30** shown in Fig. 3f. initially, window **30** displays all items returned by the search. The user may, however, select subsets of the return search results by activating a desired button from the "FAQ's," "Expert Commentary" or "News" buttons at the top of window **30**. To view a given document returned by

the search, the user clicks on the document title. Responsively to the selection, the applet creates an HTTP connection with the remote server and requests the identified document. The remote server servlet retrieves the document from the database and forwards the document to the client computer applet, which displays the document text in window 30.

While one or more preferred embodiments of the invention have been described above, it should be understood that any and all equivalent realizations of the present invention are included within the scope and spirit thereof. Thus, the embodiments depicted are presented by way of example only and are not intended as limitations upon the present invention, and it should be understood by those of ordinary skill in this art that the present invention is not limited to these embodiments since modifications can be made. Therefore, it is contemplated that any and all such embodiments are included in the present invention as may fall within the literal or equivalent scope of the appended claims.